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IS 5312-2 (1986): Swing Check Type Reflux (non-return)
Valves for Water Works Purpose, Part 2: Multi-Door Pattern
[CED 3: Sanitary Appliances and Water Fittings]



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IS : 5312 (Part 2) - 1986

(Reaffirmed 1997)

Indian Standard

**SPECIFICATION FOR
SWING CHECK TYPE REFLUX
(NON-RETURN) VALVES FOR
WATER WORKS PURPOSE
PART 2 MULTI-DOOR PATTERN**

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**BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002**

Indian Standard

SPECIFICATION FOR SWING CHECK TYPE REFLUX (NON-RETURN) VALVES FOR WATER WORKS PURPOSE

PART 2 MULTI-DOOR PATTERN

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Indian Standard

SPECIFICATION FOR SWING CHECK TYPE REFLUX (NON-RETURN) VALVES FOR WATER WORKS PURPOSE

PART 2 MULTI-DOOR PATTERN

0. FOREWORD

0.1 This Indian Standard (Part 2) was adopted by the Indian Standards Institution on 31 October 1986, after the draft finalized by the Sanitary Appliances and Water Fittings Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Reflux valves are generally used on rising mains as they permit water to flow in one direction only and check all the return flows. These are operated by pressure alone, having no external means of control. In large diameter pipes, the door, in single-door pattern would close slowly and reflux flow would cause water hammer due to surge. Therefore, multi-door pattern is resorted to, in such cases, so as to reduce the time required for closure. The flow may be controlled by means of flaps swinging up and down with pressures on to seats (swing check).

0.2.1 Swing check type reflux valves are commonly used in the country in water works. The requirements of swing check type reflux (non-return valves) single door pattern up to 600 mm size have been covered in IS : 5312 (Part 1)-1984*. This Part 2 of the standard covers valves with multi-door pattern.

0.3 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Specification for swing check type reflux (non-return) valves for water works purposes: Part 1 Single door pattern (*first revision*).

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard (Part 2) covers requirements for flanged reflux valves of multi-door, swing check type used for water works purpose of sizes from 400 to 1 200 mm.

2. CLASS OF VALVES

2.1 Class of reflux valves shall be designated by nominal pressure (PN), defined as the maximum permissible gauge working pressure in MPa as follows:

PN 0.6 and PN 1

3. NOMINAL SIZES

3.1 The valves shall be of the following nominal sizes:

400, 450, 500, 600, 700, 750, 800, 900, 1 000, 1 100 and 1 200 mm

3.1.1 The nominal size shall refer to the nominal bore of the water way.

3.2 Typical illustration of swing check type reflux valve is given in Fig. 1.

4. MATERIALS

4.1 The materials used for the manufacture of different component parts of valves shall conform to the requirements given in Table 1. Where alternative materials are specified in Table 1, these may be used with the approval of the purchaser.

5. BODY ENDS

5.1 Flanged Body Ends

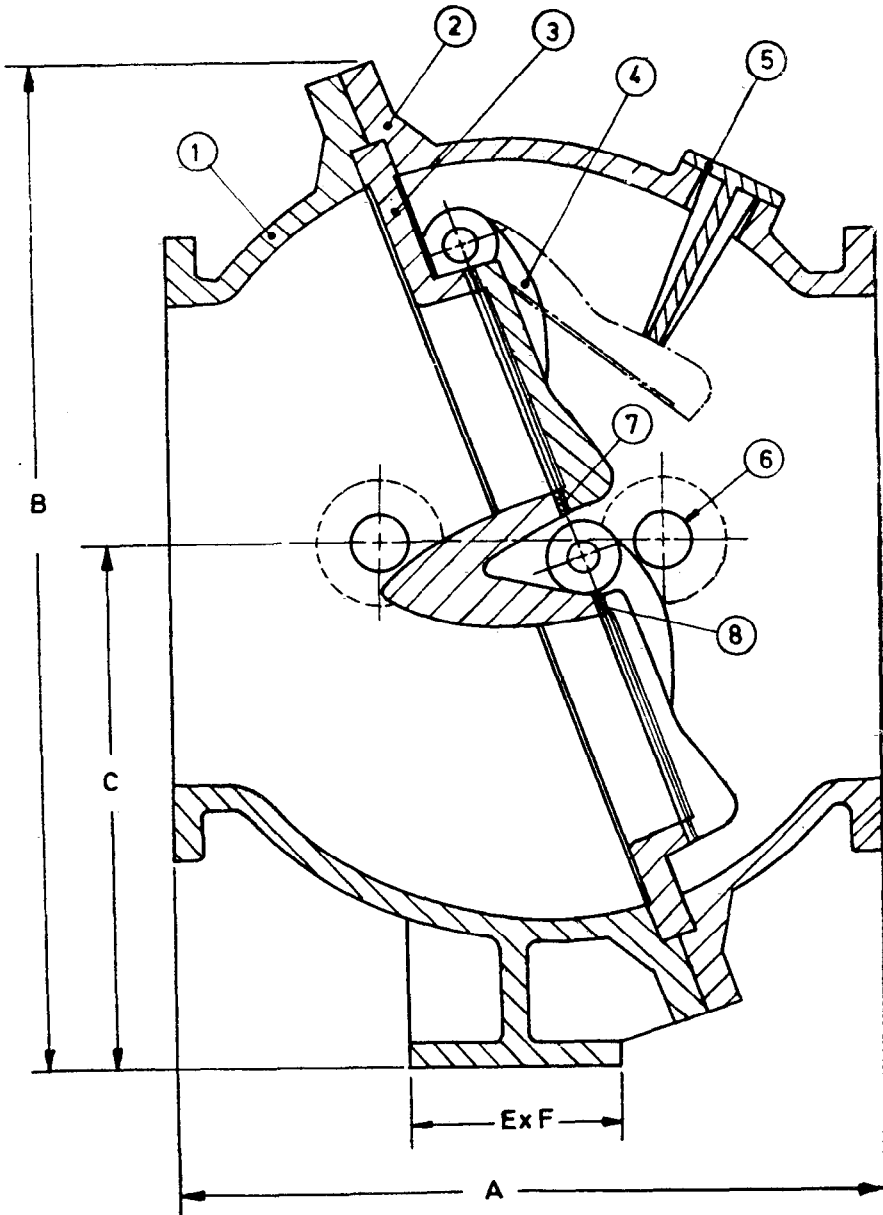
5.1.1 Unless otherwise specified in the contract or order, dimensions shall comply with the requirements of IS : 1538 (Part 4)-1976* and IS : 1538 (Part 6)-1976† or IS : 1538 (Part 5)-1976‡.

5.2 Flanges shall be drilled unless otherwise specified and bolt holes shall be 'off centres'.

*Specification for cast iron fittings for pressure pipes for water, gas and sewage: Part 4 Specific requirements for flanges of pipes and fittings (*second revision*).

†Specification for cast iron fittings for pressure pipes for water, gas and sewage: Part 6 Specific requirements for standard flange drilling of flanged pipes and fittings (*second revision*).

‡Specification for cast iron fittings for pressure pipes for water, gas and sewage: Part 5 Specific requirements for raised flanges (*second revision*).



Sl No.	Component	Sl No.	Component
1.	Inlet shell with duckfoot	5.	Stopper
2.	Outlet shell with hole for stopper	6.	Bypass assembly with bends (not shown)
3.	Diaphragm	7.	Face rings on doors
4.	Doors	8.	Seat ring on diaphragm

FIG. 1 TYPICAL MULTI-DOOR CHECK VALVE

TABLE 1 MATERIALS FOR DIFFERENT COMPONENT PARTS OF REFLUX VALVES

(Clause 4.1)

SL No.	COMPONENT	BASIC MATERIALS			ALTERNATIVE MATERIALS		
		Material	Ref to IS :	Grade or Designation	Material	Ref to IS :	Grade or Designation
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Body with hinge and diaphragm	Grey cast iron	IS : 210-1978 ¹	FG 260	a) S. G. iron b) Cast steel	IS : 1865-1974 ² IS : 1030-1982 ³	400/12 Grade B
ii)	Hinge pin	High tensile brass	a) IS : 320-1980 ⁴ b) IS : 6912-1985 ⁵	HT 2 FHTB 1	Stainless steel	a) IS : 6603-1972 ⁶ b) IS : 1570 (Part 5)-1972 ⁷	04 Cr 17Ni 12 Mo 2 or 04 Cr 18 Ni 10 12 Cr 13
iii)	Bolts	Carbon steel	IS : 1367 (Part 3)-1979 ⁸	Class 4.6	—	—	—
iv)	Nuts, nuts for hinge pins	Carbon steel	IS : 1367 (Part 6)-1980 ⁹	Class 4	—	—	—
v)	Bearing bushes	Leaded tin bronze	IS : 318-1981 ¹⁰	LTB 2	a) Austenitic iron b) PTFE/Reinforced PTFE	IS : 2749-1974 ¹¹ —	ASGN : 20 —
vi)	Face and seat rings	Leaded tin bronze	IS : 318-1981 ¹⁰	LTB 2	a) Austenitic stainless steel b) Stainless steel	IS : 6603-1972 ⁶ IS : 1570 (Part 5)-1972 ⁷	04 Cr 17 Ni 12 Mo 2 or 04 Cr 18 Ni 10 12 Cr 13
vii)	Flange jointing material	Rubber	IS : 638-1979 ¹²	—	—	—	—

- ¹Specification for grey iron castings (*third revision*).
 - ²Specification for iron castings with spheroidal or nodular graphite (*second revision*).
 - ³Specification for carbon steel castings for general purposes (*third revision*).
 - ⁴Specification for high tensile brass rods and sections (other than forging stock) (*second revision*).
 - ⁵Specification for copper and copper alloy forgings (*first revision*).
 - ⁶Specification for stainless steel bars and flats.
 - ⁷Specification for stainless and heat resisting steels (*first revision*).
 - ⁸Technical supply conditions for threaded steel fasteners: Part 3 Mechanical properties and test methods for bolts, screws and studs with full leadability (*second revision*).
 - ⁹Technical supply conditions for threaded steel fasteners: Part 6 Mechanical properties and test methods for nuts with specified proof loads (*second revision*).
 - ¹⁰Specification for leaded tin bronze ingots and castings (*second revision*).
 - ¹¹Specification for austenitic iron castings (*first revision*).
 - ¹²Specification for sheet rubber jointing and rubber insertion jointing (*second revision*).
-

5.3 The dimensions of the valves shall be as given in Table 2.

TABLE 2 DIMENSIONS OF VALVES

(Clause 5.2; and Fig. 1)

All dimensions in millimetres.

SIZE	LENGTH OVER FLANGES (A)	OVERALL HEIGHT (B)	HEIGHT OF CENTRE FROM DUCK FOOT (C)	SIZE OF DUCK FOOT (E × F)
(1)	(2)	(3)	(4)	(5)
500	815	1 150	600	200 × 250
600	914	1 333	685	254 × 254
700	1 000	1 446	750	300 × 375
750	1 045	1 446	750	300 × 375
800	1 118	1 634	850	300 × 375
900	1 250	1 570	815	300 × 375
1 000	1 250	1 730	915	300 × 375
1 100	1 396	2 069	1 080	400 × 450
1 200	1 500	2 250	1 175	400 × 450

5.4 The tolerances on the face-to-face dimensions shall be as follows:

Face-to-Face Dimensions

Tolerances

400 mm	± 2 mm
Above 400 mm up to and including 600 mm	± 3 mm
Above 600 mm up to and including 800 mm	± 4 mm
Above 800 mm up to and including 1 000 mm	± 5 mm

6. DESIGN AND MANUFACTURE

6.1 Body — The body may be made in two parts — inlet shell and outlet shell. The inlet shell shall have duck foot support.

6.2 Diaphragm — Diaphragm shall be fitted between inlet and outlet shells. The parts in the diaphragm should be so designed as to induce minimum headloss in the flow through the valve.

6.3 Water Way Area — The area of the waterway through the multi-doors in the diaphragm shall not be less than the bore area except that this area may be reduced by not more than 15 percent for any proprietary designs.

6.4 Inlet and Outlet Shell Connections — The attachment of the inlet to outlet shell of the body shall be adequate to withstand the appropriate test pressures, service conditions and the mechanical loads

encountered in the operation. All valves shall have bolted connection. Size of the bolts or studs shall not be less than 22 mm.

6.5 Seats — Seat rings shall be so fitted as to avoid their becoming loose in service. Standard countersunk screws shall not be used.

6.6 Door — The door shall be integral with the hinge and shall have a flat seating face.

6.7 Lugs — Suspension lugs shall be cast integrally on the diaphragm plate and shall be of adequate strength.

6.8 Number of Doors — The minimum number of doors (discs) in the diaphragm plate shall be two.

6.9 By-Pass Connection — By-passes are not standard items on valves to the design, but if required, it is recommended that they shall be made for connection between the inlet and outlet shell of the valve. By-passes shall conform to PN 1 of IS : 780-1984* and the minimum size of the by-pass arrangement shall be as indicated below:

<i>Size of Valve</i>	<i>Min, Size of By-Pass Arrangement</i>
400 mm	50 mm
450 mm to 600 mm	80 mm
700 mm to 1 200 mm	100 mm

6.10 Mass of Valves — The minimum finished mass of the valves shall be as follows:

<i>Nominal Size of Valve</i> (mm)	<i>Min Mass</i> (kg)
500	1 450
600	2 040
700	2 250
750	2 450
800	2 540
900	3 480
1 000	4 000
1 100	5 100
1 200	6 000

*Specification for sluice valves for water works purposes 50 to 300 mm size (sixth revision).

7. COATING

7.1 Immediately after casting and before machining all cast iron parts shall be thoroughly cleaned, and before rusting commences, shall be coated by dipping in a bath containing a composition having a tar base and maintained at temperature between 143 and 166°C. The proportions of the ingredients shall be so regulated as to produce a coating having properties specified in 7.3.

NOTE 1 — The valves may be assembled without coating if the purchasing organization specially desires to inspect the assembled valves without any coating.

NOTE 2 — From every bath one piece of smallest size and one piece of largest size should be tested for coating. Alternatively, for tar based paints the representative test piece 150 × 100 × 10 mm shall be subjected to coating test from each bath.

7.2 Casting shall be re-heated before dipping, either by immersion in hot water or by heating in an oven, or shall be held in the dipping box sufficiently long to reach an equivalent temperature, the method used being at the maker's option. Care shall be taken to see that the coatings are perfectly dry immediately before dipping. On removal from the box, the casting shall be sufficiently drained.

7.3 The coating shall be such that it shall not impart any taste or smell to water. The coating shall be smooth, glossy and tenacious, sufficiently hard so as not to flow when exposed to a temperature of 77°C and not so brittle at a temperature of 15°C as would chip off when scratched lightly with the point of a pen knife.

7.4 Alternatively, two coats of black Japan conforming to Type 3 of IS : 341-1973* or paint conforming to IS : 9862-1981† shall be applied.

8. TESTING

8.1 Before coating each valve shall be subjected to hydrostatic test given in 8.2 and 8.3. Tests shall be carried out with water. Test pressures and duration of test shall be as specified in Table 3.

TABLE 3 TEST PRESSURE (GAUGE) AND TEST DURATION OF VALVES

PN RATING OF VALVE	TEST	TEST PRESSURE (GAUGE), Min	TEST DURATION, Min
(1)	(2)	(3)	(4)
		MPa	Minutes
PN 0.6	Body test	0.9	2
	Seat test	0.6	2
PN 1	Body test	1.5	2
	Seat test	1.0	2

*Specification for black Japan, Types A, B and C (first revision).

†Specification for ready mixed paint, brushing, bituminous, black, lead-free acid, alkali, water and chlorine resisting.

8.2 Seat Test — The valve shall be placed in the horizontal position and the outlet end shall be filled with water completely. With the inlet end open to atmosphere, there shall be no leakage when the outlet end of the valve is subjected to hydrostatic, non-shock seat test pressure as given in Table 3 for two minutes. There shall be no leakage of water through the seats.

8.3 Body Test — Water shall be filled completely in the body. When the body is subjected to hydrostatic, non-shock body test pressures as given in Table 3 for two minutes, there shall be no leakage or permanent distortion of any component part under this test.

9. INSPECTION

9.1 If required, all valves shall be tested hydrostatically by the purchaser or his authorised representative at manufacturer's works. If additional tests are required by the purchaser, the same shall be clearly mentioned in the enquiry as well as in the order. The purchaser or his authorised representative shall have access to the manufacturer's works at all reasonable times to inspect the assembled valves to his order.

10. PREPARATION FOR DESPATCH

10.1 After testing all valves shall be drained, cleaned, prepared and suitably packed for despatch in such a way as to minimise the possibility of damage and deterioration during transit and storage.

10.2 The doors shall be secured for transit to prevent hammering on the body seats.

10.3 When specified, body ends shall be suitably sealed to exclude foreign matter during transit and storage.

11. INFORMATION TO BE SUPPLIED BY THE PURCHASER

11.1 The following information shall be supplied by the purchaser along with the order:

- a) Nominal size of valve required;
- b) Class of valve required;
- c) If possible, should mention the specific purpose for which the valve is required or any specification of the material;
- d) By-pass arrangement, if required;
- e) Whether test certificate required;
- f) Inspection or witnessing of tests or certificate of conformity; and
- g) Whether body ends should be sealed for despatch.

12. MARKING

12.1 The following information shall be cast on each valve body in raised letters or on a plate securely fixed to the body:

- a) **Manufacturer's name,**
- b) **Size of valve,**
- c) **Nominal pressure in MPa (*see* 2.1), and**
- d) **Direction of flow.**

12.1.1 Each valve may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

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